

ALLEGHENY PORTAGE RAILROAD, BENS CREEK CULVERT
Pennsylvania Historic Bridges Recording Project
Spanning Bens Creek at State Rt. 53
Cassandra
Cambria County
Pennsylvania

HAER No. PA-453

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Location: Spanning Bens Creek at State Rt. 53, Cassandra, Cambria County, Pennsylvania.

USGS Quadrangle: Ebensburg, Pennsylvania (7.5-minute series, photorevised 1994).

UTM Coordinates: 17/700260/4474840

Date of Construction: 1832.

Designer: Allegheny Portage Railroad (Commonwealth of Pennsylvania).

Builder: Fenlon, Darlings and Co., contractor.

Present Owner: Pennsylvania Department of Transportation.

Present Use: Vehicular bridge.

Significance: The Bens Creek Culvert is significant as an outstanding example of early nineteenth-century masonry arch construction, and for its association with the Allegheny Portage Railroad, which the bridge originally carried across Bens Creek. The Allegheny Portage Railroad, a system of rail lines and inclined planes completed in 1834, was designed to carry boats from the Pennsylvania Main Line Canal across the Allegheny Mountains. Although the entire railroad was abandoned in 1857, the Bens Creek Culvert was converted to vehicular traffic in 1855 when a section of railroad was rerouted to avoid the inclined planes. The bridge was listed in the National Register of Historic Places in 1988.

Historian: Dr. David S. Rotenstein, August 1997.

Project Information: This bridge was documented by the Historic American Engineering Record (HAER) as part of the Pennsylvania Historic Bridges Recording Project - I, co-sponsored by the Pennsylvania Department of Transportation (PennDOT) and the Pennsylvania Historical and Museum Commission during the summer of 1997. The project was supervised by Eric DeLony, Chief of HAER.

DESCRIPTION

The Bens Creek Culvert spans Bens Creek with an elliptical stone arch of 18'-0" span. The original arch barrel on the west (downstream) end, roughly 62'-6", ascends from a height of 10'-6" at the outlet to a height of 12'-0" at its juncture with a 1936 extension to the east.¹ The extension is at a slight angle to the original barrel. Although the extension's 114'-0"-long stone arch barrel continues to ascend, the more rapidly rising streambed reduces its height to 9'-0" at the inlet. The west (downstream) head wall measures 22'-0" wide between curving wing walls which extend approximately eight feet beyond. The head wall does not extend above the voussoirs; a grass-covered slope leads up to the roadbed some twenty feet above the streambed. The 13'-0" east (upstream) head wall also measures 22'-0" between wing walls, which extend 17'-6" beyond. The bridge carries State Route 53, approximately thirty-eight feet wide, and a diverging township road.

Like many other railroad bridges in culverts in Cambria County, the Bens Creek Culvert was constructed of local sandstone. Here, the stone is laid as coursed ashlar blocks with lime mortar joints.² A special characteristic of the original part of the Bens Creek Culvert is the original timber cribbing exposed at several points in the streambed. Concrete channel paving was recently placed in the extension, although the timber remains in the original section. The culvert's wing walls are also notable, for they are curved on the downstream side of the structure (the upstream side was presumably similar before the extension). The lack of a parapet underscores the culvert's intended function to carry the portage railroad over Bens Creek.

HISTORICAL INFORMATION

Allegheny Portage Railroad

Between the mid-1820s and 1850 or so, Pennsylvania undertook and sponsored a massive program of internal improvements, including the construction of canals, turnpikes, and railroads.³ In 1826, the Pennsylvania legislature passed an act authorizing the construction of a cross-state

¹ Dimensions from inspection report in Pennsylvania Department of Transportation, bridge inspection file, BMS No. 11-0053-0190-1026, PennDOT District 9-0, Hollidaysburg, Pa.

² Ralph W. Stone, *Building Stones of Pennsylvania*, Pennsylvania Geological Survey, Fourth Series, Bulletin M-15 (Harrisburg: Pennsylvania Geological Survey, 1932), 85.

³ Pennsylvania's transportation history has been amply and voluminously documented by historians, economists, and engineers. Although a complete discussion is beyond the scope of this report, the history of the survey and construction of the Allegheny Portage Railroad is covered at length in Anna Cox Toogood, *Historic Resource Study: Allegheny Portage Railroad National Historic Site, Pennsylvania* (Washington, D.C.: U.S. Department of the Interior, National Park Service, Denver Service Center, 1973).

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canal linking Philadelphia with Pittsburgh.⁴ Like their counterparts in New York on the Erie Canal, Pennsylvania's canal builders had a nearly insurmountable problem: providing passage across the natural barrier formed by the Allegheny Mountains.⁵ Pennsylvania's canal commissioners believed they had found a solution to the problem by constructing a series of ten inclined planes connected by a portage railroad thirty-six miles long.

On 4 March 1828, the Pennsylvania legislature passed an act which led to the birth of the Pennsylvania Railroad: "An Act Relative to the Pennsylvania canal, and to provide for the commencement of a rail road, to be constructed at the expense of the state, and to be styled the Pennsylvania rail road."⁶ The survey and construction of the Allegheny Portage Railroad was authorized in Section 4 of that same act:

[T]he board of canal commissioners are authorized and required, to locate by the most eligible route a rail road across the Allegheny mountain, with a view of connecting the Juniata and Conemaugh sections of the Pennsylvania canal, and they are further authorised [sic.], to make such contracts as will secure the completion of said rail road, as early as the completion of said sections of canal.⁷

In addition to the Allegheny Mountains, engineers involved in designing and constructing the portage railroad also had to cross several rivers and many intermittent streams. By the time the Allegheny Portage Railroad was completed, there were four viaducts spanning the Conemaugh River and three branches of the Juniata River, and sixty-eight culverts.⁸

Culverts

Engineers responsible for surveying and constructing the Allegheny Portage Railroad determined that seventy-two culverts would be required to cross small streams within the road's corridor. In a November 1831 report to the Board of Canal Commissioners, chief engineer Sylvester Welch wrote,

The viaducts, culverts, etc. are supposed to be contracted for, generally, at fair prices. Some of the small culverts will probably be abandoned, but they will be

⁴ David Fritz and A. Berle Clemenson, *Pennsylvania Main Line Canal: Juniata and Western Divisions* (Washington, D.C.: United States Department of the Interior, National Park Service, 1992), 4.

⁵ Fritz and Clemenson; Elizabeth Brand Monroe, *The Wheeling Bridge Case: Its Significance in American Law and Technology* (Boston: Northeastern University Press, 1992), 16; Toogood, *Historic Resource Study*, 1-2.

⁶ Commonwealth of Pennsylvania, P.L. 221 (1828).

⁷ Pennsylvania, P.L. 221, Section 4. The history of the survey and construction of the Allegheny Portage Railroad is thoroughly covered at length in Toogood.

⁸ Toogood, *Historic Resource Study*, 36.

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built by other contractors at prices not differing materially from those fixed by the existing contracts. A careful estimate has been made of each viaduct, culvert, etc. And the actual cost, when finished, cannot vary, naturally, from the amount stated below.⁹

Welch estimated the total cost for the construction of "viaducts, culverts, bridges, etc." at \$110,473.68. This figure represented approximately nine percent of the total estimated cost of just over \$1.25 million for the entire railroad.

According to engineer Welch, there were two types of culvert: those with spans of ten feet or more and those with spans under ten feet.¹⁰ Culverts on the Portage Railroad had spans that ranged from three feet to twenty-five feet (Table 1).

Table 1 Allegheny Portage Railroad Culverts.

Span	Number of Culverts	Percent of Total
3'	52	57.14
4'	7	7.69
5'	6	6.59
7'	4	4.40
8'	2	2.20
10'	5	5.49
12'	3	3.30
14'	3	3.30
16'	2	2.20
18'	4	4.40
20'	1	1.10
25'	2	2.20
TOTAL	91	100

Source: S. Jones, "Report of S. Jones, Superintendent," *Pennsylvania House of Representatives Journal, House Report 47*, No. 1, Appendix (1831): 184.

A majority of the culverts constructed along the Allegheny Portage Railroad corridor were small culverts with three-foot spans. As the project neared its completion, Welch wrote,

⁹ Letter report of Sylvester Welch, 14 November 1831, Box 8, Record Group 17, Board of Canal Commissioners, Allegheny Portage Railroad Divisional Records, Pennsylvania State Archives, Harrisburg, Pa. (hereafter cited as APRR Records).

¹⁰ Sylvester Welch, "Report of Sylvester Welch, Engineer," *Pennsylvania House of Representatives Journal, House Report 47*, No. 1 (1831): 187.

The culverts are built of good stone laid in common lime mortar. The faces of the walls at the ends of each culvert are built of hammered stone, laid in courses. The coping and steps and the voussoirs that form the heads of the arch, are smoothly cut.¹¹

The Board of Canal Commissioners selected thirty-nine contractors to construct culverts for the Portage Railroad. Construction commenced in the middle of 1831 and was completed by the end of 1832. In November 1831, Sylvester Welch wrote, "Considerable progress has been made in the construction of the culverts." He added,

There are twenty, of ten feet span and upwards, of these, the foundations of thirteen have been laid, and the masonry commenced. Several of them are nearly completed; of the remaining seven, the pits for five are excavated, and the materials for the culverts are partly delivered — on the remaining two, nothing of importance has been done. Of the smaller culverts, fifty-two in number, the mason work on twenty has been commenced. Several of them are finished, and others are far advanced towards completion. The remaining thirty-two, are generally from three to five feet span — materials are delivered at some of them; and, at others nothing has been done.¹²

One year later, on 1 November 1832, Welch was able to report, "The culverts and viaducts are all finished or in an advanced state."¹³ According to Welch, construction was delayed because of a severe winter and difficulties in obtaining labor.¹⁴ Despite the delays, however, construction of the culverts exceeded construction estimates by only \$704.39.¹⁵

The Portage Railroad: A Short Life

Although portions of the Pennsylvania Main Line Canal were operating between Philadelphia and Pittsburgh by 1829, the line was not completely open until the completion of the Allegheny Portage Railroad in the spring of 1834.¹⁶ By the time the works were completed,

¹¹ Sylvester Welch, "Report of Sylvester Welch, Engineer," *Pennsylvania House of Representatives Journal*, House Report 15, No. 7 (1832): 76.

¹² Welch, "Report" (1831): 187.

¹³ Welch, "Report" (1832): 73.

¹⁴ Welch, "Report" (1832): 73.

¹⁵ Welch reported that the aggregate estimated cost for the culverts was \$33,782.23 and the actual cost, in 1832, was \$34,486.62; see Welch, "Report" (1832): 77-78.

¹⁶ Fritz and Clemenson, *Pennsylvania Main Line Canal*; Toogood, *Historic Resource Study*.

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the system already had been rendered obsolete by emerging railroad technology. Because of the time and expense involved in use of the inclined plane system along the portage railroad, in addition to its constant maintenance and repair needs, the facility never made a profit and was constantly the source of complaints from shippers, merchants, and industrialists.

William Bender Wilson, in his 1899 report on the Pennsylvania Railroad, quoted an 1850 speech by then-governor William F. Johnston: "The Portage Railroad, from the completion of our line of improvements to the present time, has been a serious obstacle to the business of the community and the occasion of trade seeking other channels to the Atlantic markets."¹⁷ In 1845, *Hunt's Merchant's Magazine* observed of the Allegheny Portage Railroad, "during the ten years this railway has been in operation, it has not produced any net revenue."¹⁸

Less than six months after Johnston's scathing commentary on the portage railroad, the Pennsylvania legislature passed an act to construct an alternate rail route to avoid the inclined planes.¹⁹ Although a relocated route was established and went into use in 1855, the Allegheny Portage Railroad was closed 1 November 1857, and much of its masonry and rails were salvaged by its new owner, the Pennsylvania Railroad, for use in other facilities: "The Portage roads, both old and new, having outlived their usefulness [sic.], were abandoned."²⁰

Bens Creek Culvert

Officially known as "Section No. 27, Culvert A" of the Allegheny Portage Railroad, the Bens Creek Culvert spans Bens Creek at the base of Inclined Plane No. 3. The culvert was constructed in the 3,700'-0"-long Section No. 27. According to Chief Engineer Sylvester Welch, the culvert was built at the western end of Section No. 27:

The line passes over ground nearly level 800 feet to the foot of inclined plane No. 3 (Bens Creek) thence obliquely up the hill 1,500 feet to the head of the plane, thence across a projecting point, curving with a radius of 440 feet, 600 feet — thence along the side of the hill to the end of the section....²¹

¹⁷ William Bender Wilson, "The Evolution, Decadence and Abandonment of the Allegheny Portage Railroad," in *The Allegheny Portage Railroad: Annual Report of the Secretary of Internal Affairs 1898-1899*, ed. Mahlon J. Baumgardner (1900; reprint, 1952), 77.

¹⁸ "Main Line of State Works of Pennsylvania," *Hunt's Merchant's Magazine* 13 (1845): 133.

¹⁹ Wilson, "Evolution, Decadence, and Abandonment," 77.

²⁰ Wilson, "Evolution, Decadence, and Abandonment," 83.

²¹ Report, Box 8, APRR Records.

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A "Map of Road to Avoid Inclined Planes," prepared in the 1850s, shows what became known as the Bens Creek Culvert spanning Bens Creek near its confluence with the Conemaugh River.²² A cluster of buildings — the predecessors to the current borough of Cassandra — is also illustrated in the map.

Welch, in one of his earliest reports on the survey and construction of the proposed portage railroad, noted that Culvert A on Section No. 27 would have an elliptical span of 18'-0" and would contain 470 perches (11,632.5 cubic feet) of masonry.²³ The original estimated cost to construct the culvert was \$1,405: \$1,128 for masonry at \$2.40 per perch plus \$277.50 for 18,500 board feet of timber at 1.5 cents per foot.²⁴

The firm of Fenlon, Darlings and Co. was awarded the contract to construct the Bens Creek Culvert. Fenlon, Darlings and Co. was one of thirty-nine contractors selected to construct culverts along the portage railroad.²⁵ In addition to the Bens Creek Culvert, Fenlon, Darlings & Co. also built the only culvert in the section immediately to the west (Section 26, Culvert A).

The Bens Creek Culvert was completed by 1 November 1832.²⁶ The completed structure contained 401.67 perches (9,941.33 cubic feet) of masonry and 18,382.66 board feet of lumber were used in its construction. The total construction cost of the culvert was \$1,239.75 — 12 percent less than the original \$1,405 estimated cost.²⁷

After the 1857 abandonment of the Allegheny Portage Railroad, the tracks were removed from the right-of-way in the vicinity of the Bens Creek Culvert and it was converted into a surface road known as "Portage Street."²⁸ The Commonwealth of Pennsylvania never relinquished title to the right-of-way after its abandonment of the railroad. In 1911, the Pennsylvania legislature passed an act establishing the State Highway Department (now PennDOT). In addition to creating the departmental architecture for the new agency, the act also transferred "existing public roads, highways, turnpikes ..." into a newly created state highway

²² Map Book No. 13, APRR Records.

²³ Stone was measured in cords or perches. Although a perch of stone legally consisted of 24 3/4 cubic feet, one description of how masons measured a perch suggests that it was more often 16 1/2 cubic feet. See Harley J. McKee, *Introduction to Early American Masonry* (New York: National Trust for Historic Preservation and Columbia University, 1973), 20.

²⁴ Report of Sylvester Welch, 5 Mar. 1832, Box 8, APRR Records.

²⁵ Welch, "Report" (1832): Table 2.

²⁶ Welch, "Report" (1832).

²⁷ Welch, "Report" (1832).

²⁸ J. A. Caldwell, *Illustrated Historical Combination Atlas of Cambria County, Pennsylvania* (Philadelphia: Atlas Publishing Co., 1890).

system.²⁹ The highway on which the Bens Creek Culvert is located became known as Legislative Route 276 (now State Route 53), a route running from Somerset to Clearfield.

In 1988, the Bens Creek Culvert was listed in the National Register of Historic Places as an element of the multiple resource listing "Highway Bridges Owned by the Commonwealth of Pennsylvania, Department of Transportation." The listing was updated and its boundary increased in 1993.³⁰

²⁹ Commonwealth of Pennsylvania, P.L. 468 (1911).

³⁰ The 1993 amendment rectified several problems with the 1988 nomination, including the name "Bridge in Cassandra Borough" and its decontextualization from the larger historic resource of the Allegheny Portage Railroad.

SOURCES CONSULTED

- Caldwell, J. A. *Illustrated Historical Combination Atlas of Cambria County, Pennsylvania*. Philadelphia: Atlas Publishing Co., 1890.
- Cambria County, Pennsylvania. *Deed Books*. Register and Recorder of Deeds, Cambria County Courthouse, Ebensburg, Pa.
- _____. *Road Dockets*. Register and Recorder of Deeds, Cambria County Courthouse, Ebensburg, Pa.
- Fritz, David, and A. Berle Clemenson. *Pennsylvania Main Line Canal: Juniata and Western Divisions*. Washington, D.C.: United States Department of the Interior, National Park Service, 1992.
- Jones, S. "Report of S. Jones, Superintendent." *Pennsylvania House of Representatives Journal, House Report 47*, No. 1, Appendix (1831).
- Laws of Pennsylvania*.
- "Main Line of State Works of Pennsylvania." *Hunt's Merchant's Magazine* 13 (1845): 97-151.
- McKee, Harley J. *Introduction to Early American Masonry*. New York: National Trust for Historic Preservation and Columbia University, 1973.
- Monroe, Elizabeth Brand. *The Wheeling Bridge Case: Its Significance in American Law and Technology*. Boston: Northeastern University Press, 1992.
- Pennsylvania Department of Transportation. Bridge inspection file, BMS No. 11-0053-0190-1026, PennDOT District 9-0, Hollidaysburg, Pa.
- Pennsylvania State Archives, Harrisburg, Pennsylvania. Record Group 17, Board of Canal Commissioners, Allegheny Portage Railroad Divisional Records.
- Stone, Ralph W. *Building Stones of Pennsylvania*. Pennsylvania Geological Survey, Fourth Series, Bulletin M-15. Harrisburg: Pennsylvania Geological Survey, 1932.
- Toogood, Anna Coxe. *Historic Resource Study: Allegheny Portage Railroad National Historic Site, Pennsylvania*. Washington, D.C.: U.S. Department of the Interior, National Park Service, Denver Service Center, 1973.
- Welch, Sylvester. "Report of Sylvester Welch, Engineer." *Pennsylvania House of Representatives Journal, House Report 47*, No. 1, Appendix (1831).
- _____. "Report of Sylvester Welch, Engineer." *Pennsylvania House of Representatives Journal, House Report 15*, No. 7, Appendix (1832).

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Wilson, William Bender. "The Evolution, Decadence and Abandonment of the Allegheny Portage Railroad." In *The Allegheny Portage Railroad: Annual Report of the Secretary of Internal Affairs 1898-1899*, ed. Mahlon J. Baumgardner. 1900. Reprint, 1952.